Barrier Infrared Detector (BIRD)

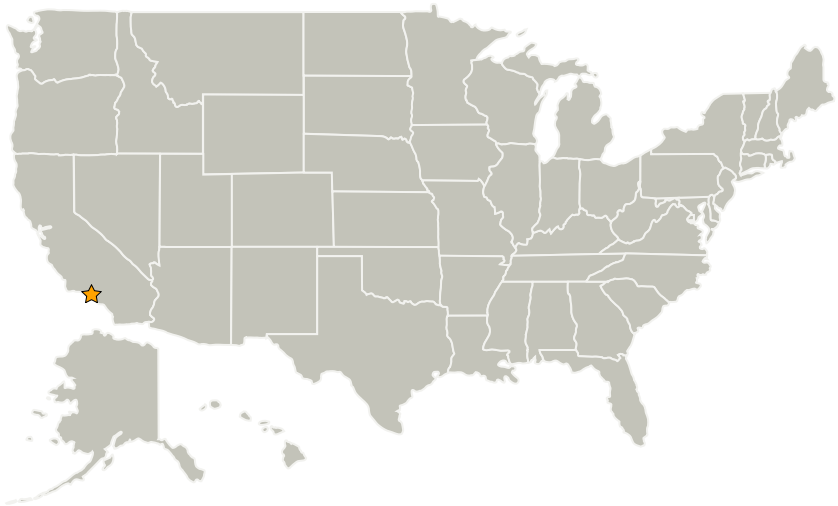
Completed Technology Project (2012 - 2012)

Project Introduction

A recent breakthrough in MWIR detector design, has resulted in a high operating temperature (HOT) barrier infrared detector (BIRD) that is capable of spectral coverage of not only the entire MWIR atmospheric transmission window (3 – 5 μm), but also the short-wave infrared (SWIR; 1.4 – 3 μm), the near infrared (NIR; 0.75 – 1.4 μm) and the visible bands. While other advanced MWIR detector designs have been able to achieve high temperature operation with 4 μm cutoff wavelength, the JPL invention is unique in that its spectral coverage includes the entire MWIR atmospheric transmission window.

JPL will design, fabricate, and fully characterize a 640x512 format HOT-BIRD FPA with increased quantum efficiency and extended spectral coverage. Unlike the small format experimental FPA, the proposed FPA will undergo a substrate removal process which extends the cut-on wavelength into the visible range, as well as paving the way towards very large-format (multi-megapixel) arrays. One advantage of the extended spectral coverage FPA is that it eliminates the need for multiple infrared planes; a single optical train can be used to cover the visible to MWIR spectral bands on imagers, spectrometers, spectral-imagers, and hyper-spectral imagers. The other key advantage is the higher operating temperature, which enables passively cooled operations from low earth orbit (LEO), eliminating the need for active coolers. Passive cooled systems use no moving parts, have no vibrations, and provide better reliability. These advantages lead to a reduction in instrument size, mass, mechanical complexity, optical complexity (i.e., no beam splitters, prisms, etc.) and power requirements.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Game Changing Development

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Project Management

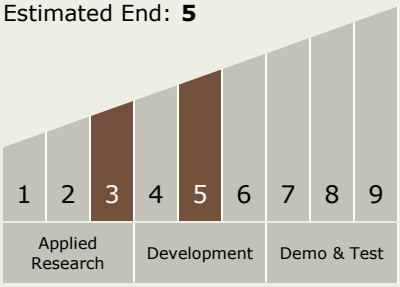
Program Director:
Mary J Werkheiser

Program Manager:
Gary F Meyering

Project Manager:
Sarath D Gunapala

Technology Maturity (TRL)

Start: **3**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes